

### A Race Against Time In Emergency Department: Necrotizing Fasciitis

 Gozde Yilmaz<sup>1</sup>,  Vahit Sener<sup>1</sup>,  Ismail Furkan Simsek<sup>2</sup>,  Necmi Baykan<sup>1</sup>,  Omer Salt<sup>1</sup>

<sup>1</sup>Emergency Department, Kayseri City Hospital, Kayseri, Turkey

<sup>2</sup>Radiology Department, Kayseri City Hospital, Kayseri, Turkey

#### Abstract

Necrotizing fasciitis is an important disease caused by multiple bacteria resulting in necrosis of the skin and soft tissue. Swelling, discoloration and bullae formation may be observed in the affected area. The presence of crepitation under the skin on palpation is a warning sign for necrotizing fasciitis. In our case, necrotizing fasciitis was considered as a preliminary diagnosis after a comprehensive systemic examination in a patient admitted to the emergency department with hyperglycemia. The diagnosis was confirmed by imaging, but the patient died before treatment could be started. Since the mortality rate is quite high, rapid diagnosis and initiation of treatment is very important.

**Keywords:** Necrotizing fasciitis; Soft tissue infection; Diabetes mellitus.

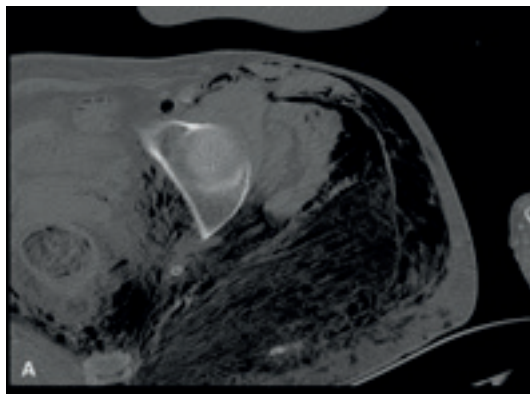
#### Introduction

Necrotizing fasciitis is a rare, rapidly progressive infection that causes extensive necrosis of fascia and subcutaneous tissue (1). In most cases, the causative agent is the virulent form of group A streptococci (2). Cellulitis and erysipelas are more common in the emergency department. Necrotizing fasciitis differs from these diseases by its rapid spread and the presence of systemic and laboratory disorders. LRINEC score is used as an important marker in distinguishing necrotizing fasciitis from other soft tissue infections. Treatment includes debridement of necrotic tissues, broad spectrum antibiotics, hyperbaric oxygen, heparin, ultraviolet, intravenous immunoglobulin and supportive therapy. In this case, we tried to emphasize the importance of detailed systemic examination in patients presenting to the emergency department with a different prediagnosis and how this serious condition can be fatal. It is known that blood sugar regulation is impaired in sepsis, so sepsis should be kept in mind in patients presenting to the emergency department with hyperglycemia.

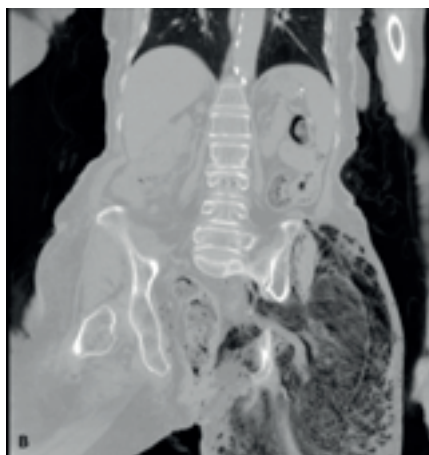
#### Case Report

An 81-year-old woman was admitted to the emergency department with complaints of high blood glucose. She had

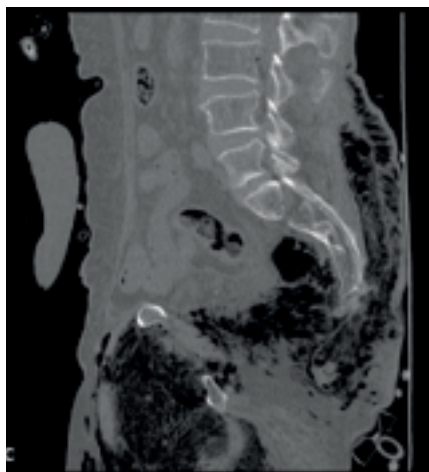
a history of hypertension, diabetes mellitus and coronary artery disease. At the time of admission, blood pressure was 112/63 mmHg, pulse 103/min, SpO<sub>2</sub> 98%, temperature 36.4 °C, and fingerstick blood glucose 379 mg/dL. In the physical examination of the patient; GCS was 15 and muscle strength in the left lower extremity was 3/5. There were no acute pathologic findings in other neurologic examinations. On examination of the left lower extremity, tenderness and subcutaneous crepitation were detected from the distal thigh to the left lower quadrant wall of the abdomen on palpation. When the patient's anamnesis was deepened and history of trauma was questioned, it was learned that the patient felt pain in his left leg after falling from the same level 2 days ago. Appropriate laboratory and radiologic investigations were ordered. Based on the examination findings of the patient, necrotizing fasciitis was considered in the preliminary diagnosis and the LRINEC score was calculated. The patient's LRINEC score was 11. To confirm the diagnosis, the patient underwent radiological imaging without waiting for the results of the blood tests. Allergy was questioned and antibiotherapy was started immediately. There were no acute pathologic findings on brain CT. CT scan of the thigh and abdomen showed emphysema and edema findings compatible with diffuse necrotic myofasciitis in the left gluteal and thigh skin, subcutaneous and muscle planes, perineum and extending to the right (Figure A, B, C). Air densities extending from the left iliac veins to the vena



**Figure A:** Wide spread subcutaneous intraabdominal and intravascular air densities (Axial section)



**Figure B:** Wide spread subcutaneous and intraabdominal air densities (Coronal section)



**Figure C:** Wide spread subcutaneous air densities (Sagittal section)

cava inferior were observed. No fractures were observed in bone structures. Laboratory tests revealed pH:7.31 lactate:8 mmol/L WBC:31.1  $10^3/\mu\text{L}$  NEU:28.9  $10^3/\mu\text{L}$  Glucose:368 mg/dL AST:159 U/L CRP:310 mg/L and other laboratory values were within normal limits. Although the patient was sent for imaging immediately after the physical examination, the patient developed cardiac arrest after the CT scan was completed. There was no response to CPR in the resuscitation area and the patient was considered ex.

## Discussion

Necrotizing fasciitis is a rare soft tissue infection with a fulminant course that can lead to limb amputation or death in patients and requires urgent medical attention. Risk factors for necrotizing fasciitis include old age, smoking, alcohol abuse, obesity, diabetes, peripheral vascular disease, liver disease, tumors, and long-term high-dose steroid use, of which diabetes is the most common risk factor (3). Hyperglycemia affects innate immunity, causes mitochondrial abnormalities, and also increases apoptosis through toxic pathways. Glucose variability (standard deviation of the average glucose level) is high in septic patients.(4) It is especially important to differentiate it from cellulitis, which has relatively less clinical severity. Using biochemical parameters, the LRINEC score (laboratory risk indicator for necrotizing fasciitis) (Table 1,2) can be calculated to differentiate necrotizing fasciitis from other soft tissue infections (5,6). The overall morbidity and mortality rates are around 70-80%. One of the most important determinants of mortality is delayed diagnosis of necrosis; therefore, computed tomography plays a vital role in early diagnosis to start treatment rapidly (7). Early diagnosis, rapid and aggressive surgical debridement, antibiotic therapy and supportive care are the basic principles to be relied upon for a better prognosis (8). In this case, the delay in presentation to the emergency department and the absence of any history of diagnosis and treatment after previous trauma increased mortality. When a patient presents to the emergency

**Table 1:** The laboratory risk indicator for necrotizing fasciitis score

Variable	Value	Score
C-Reactive protein (mg/L)	≤150	0
	>150	4
Total white blood cell count (1000 cells/ $\mu\text{L}$ )	<15	0
	15-25	1
	>25	2
Hemoglobin (g/dL)	>13.5	0
	11-13.5	1
	<11	2
Sodium (mmol/L)	≥135	0
	<135	2
Creatinine (mg/dL)	≤1.6	0
	>1.6	2
Glucose (mg/dL)	≤180	0
	>180	1

**Table 2:** LRINEC risk assessment.

Risk Category	LRINEC Points	Probability for Presence of NF
Low	≤5	<50%
Medium	6–7	50–75%
High	≥8	>75%

NF: Necrotizing fasciitis

department with any complaint, all systemic examinations other than the system of the presenting complaint should be performed and other diagnoses of the patient should be taken into consideration. In cases where necrotizing fasciitis is thought to be the diagnosis as a result of clinical evaluation and imaging tests, antibiotic treatment should be started immediately and emergency surgery should be planned (9). Since the mortality rate is quite high, emergency physicians should differentiate and prioritize these patients. Similarly, rapid consultation of these cases to the relevant specialties is also important.

## References

1. Chowdary MS, Srinivasan D, Sreeramulu PN, Tejaswini MP, Krishna PK. The clinical efficacy of laboratory risk indicator for necrotizing fasciitis score in early diagnosis of patients with necrotizing fasciitis. *International Surgery Journal*. 2021;8.7:2133-9.
2. İlhan M, Gemici E, Yanar F, Kapan S, Alış H. Nekrotizan fasiit tedavi yaklaşımları: 5 yıllık tek merkez deneyimi. *Med J Bakirkoy*. 2014;10.2:70-4.
3. Zhang Z, Liu P, Yang B, Li J, Wang W, Yang H, et al. Necrotizing fasciitis caused by diabetic foot. *Int J Infect Dis*. 2020;14:316-27.
4. Buyukkocak Unase Sepsiste glukoz kontrolü. *Flora İnfeksiyon Hastalıkları ve Klinik Mikrobiyoloji Dergisi*, vol.15, no.3, 2010, ss.97 - 104
5. Colak E, Ozlem N, Kucuk GO, Aktimur R, Kesmer S. Laboratory risk indicators for necrotizing fasciitis and associations with mortality. *Turk J Emerg Med* 2014;14:15-9.
6. Carbonetti F, Cremona A, Carusi V, Guidi M, Iannicelli E, Di Girolamo M. The role of contrast enhanced computed tomography in the diagnosis of necrotizing fasciitis and comparison with the laboratory risk indicator for necrotizing fasciitis (LRINEC). *Radiol Med*. 2016;121:106-21.
7. Fayad LM, Carrino JA, Fishman EK. Musculoskeletal Infection: Role of CT in the emergency department. *Radiographics*. 2007;27:1723-36.
8. Ditsios K, Chitas K, Christidis P, Charatsis K, Katsimentzas T, Papadopoulos P. Necrotizing fasciitis of the upper extremity—A review. *Orthopedic Reviews*. 2022;14:3.
9. Yakar Ş, Kantar Y, Baykan N. Gecikilen vakada kaçınılmaz ölüm: nekrotizan fasiit vaka sunumu. *Dokuz Eylül Üniversitesi Tıp Fakültesi Dergisi*. 2018;32(1):53-7.